

WHAT IS CLAIMED IS:

1. A vehicle crash simulator comprising:
 - a simulation platform;
 - a motion generator including a plurality of actuators translationally fixed to the simulation platform; and
 - a motion controller configured to operate the plurality of actuators to impart a simulated crash motion or force to the simulation platform.
2. The vehicle crash simulator of claim 1 and further comprising the velocity generator coupled to the motion controller and configured to operate the velocity generator to impart a crash acceleration to the simulation platform.
3. The vehicle crash simulator of claim 2 wherein the simulation platform is on-board a base sled and the velocity generator is coupled to the base sled to accelerate or move the base sled to impart the crash acceleration to the simulation platform.
4. The vehicle crash simulator of claim 3 wherein the plurality of actuators are on-board the base sled and movable therewith along an acceleration stroke.

5. The vehicle crash simulator of claim 3 wherein
the base sled is movable along a track formed of
opposed spaced rails.

5 6. The vehicle crash simulator of claim 1 wherein
the plurality of actuators are coupled to the
simulation platform and configured to impart force
and motion F_z along a z-axis of the simulation
platform and one of force and motion F_y or force and
10 motion F_x along x or y axes of the platform.

7. The vehicle crash simulator of claim 1 wherein
the plurality of actuators are coupled to the
simulation platform to impart a resultant force F_r or
15 motion having multi-axis force components.

8. The vehicle crash simulator of claim 1 the
plurality of actuators are coupled to opposed ends of
the simulation platform and operable by the motion
20 controller to impart a simulated crash acceleration.

9. The vehicle crash simulator of claim 1 including
a plurality of actuators coupled to opposed sides of
the simulation platform to simulate a force F_y along
25 the y-axis and a plurality of actuators coupled to
the simulation platform to simulate force F_z along the
z-axis.

10. A vehicle crash simulator comprising:
 - a simulation platform;
 - 5 a motion generator including a plurality of actuators operably coupled to the simulation platform to impart a plurality of multi-axial forces F_z along a z-axis, F_x along an x-axis or F_y along a y-axis to the simulation platform; and
 - 10 a motion controller configured to operate the plurality of actuators to impart the plurality of multi-axial forces.
11. The vehicle crash simulator of claim 10 wherein the plurality of actuators are on-board a base sled and
15 movable therewith along a track to simulate crash accelerations.
12. The vehicle crash simulator of claim 11 wherein the plurality of actuators are inclined between the
20 base sled and the platform to impart a resultant Force F_r including a F_z force component and a force F_x or force F_y component.
13. The vehicle crash simulator of claim 10 wherein
25 the plurality of actuators are operable to impart force F_z , force F_y and force F_x relative to x, y and z axes.

14. The vehicle crash simulator of claim 11 wherein
the simulator includes a velocity generator to impart
a crash acceleration pulse to the base sled.

5 15. The vehicle crash simulator of claim 11 wherein
the simulation platform is coupled to the base sled
via the plurality of actuators.

10 16. The vehicle crash simulator of claim 10 wherein
the plurality of actuators impart force F_x along the
x-axis to simulate crash accelerations and force F_z
and force F_y to simulate crash motions.

17. A vehicle crash simulator comprising:
15 a simulation platform;
 a simulator configured to impart acceleration or
 force to the simulation platform to
 simulate crash accelerations or motions;
 and
20 a video imaging system including a video camera
 to capture an image of a simulated crash
 event to control operation of the
 simulator.

25 18. The crash simulator of claim 17 wherein the
video imaging system includes an image processor to
provide acceleration or motion feedback to the
simulator.

19. A method for simulating a vehicle crash comprising the steps of:

simulating a crash acceleration pulse by accelerating a base sled having a platform carried on board the base sled; and

simulating crash forces or motions through a plurality of actuators on board the base sled.

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20. The method of claim 19 wherein the crash acceleration and the crash forces or motions are simulated based upon feedback from a video imaging system to control the plurality of actuators.

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21. The method of claim 19 wherein the step of simulating the crash forces or motions simulates motion relative to six degrees of freedom.

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22. A method for simulating a vehicle crash comprising the steps of:

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controlling a plurality of actuators connected to a simulation platform to impart force to the simulation platform along multiple x, y or z axes to simulate crash acceleration or motions.

23. The method of claim 22 wherein the step of simulating crash acceleration or motions comprises:

actuating the plurality of actuators to impart multiple forces, force F_z , force 5 F_x or force F_y to the simulation platform.

24. The method of claim 22 wherein the step of simulating crash forces or motions simulates pitch, yaw 10 and roll motion of a vehicle crash.

25. The method of claim 22 and further comprising the step of:

accelerating a base sled carrying the 15 simulation platform to simulate crash acceleration.

26. The method of claim 22 wherein the step of controlling the plurality of actuators provides a force 20 F_x to simulate a crash acceleration.